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**Committee on the Peaceful
Uses of Outer Space
Scientific and Technical Subcommittee
Fifty-ninth session
Vienna, 7–18 February 2022**

Draft report

X. Long-term sustainability of outer space activities

1. In accordance with General Assembly resolution 76/76, the Subcommittee considered agenda item 13, entitled “Long-term sustainability of outer space activities”.
2. The representatives of Algeria, Australia, Austria, Brazil, Canada, China, Finland, France, Germany, India, Indonesia, Japan, Luxembourg, Mexico, the Republic of Korea, the Russian Federation, South Africa, Thailand, the United Kingdom, the United States and Venezuela (Bolivarian Republic of) made statements under agenda item 13. Statements were also made by the observers for ESA, the Square Kilometre Array Observatory and the Open Lunar Foundation. During the general exchange of views, statements relating to the item were also made by representatives of other member States.
3. The Subcommittee heard the following scientific and technical presentations:
 - (a) “Capacity-building with the Space Safety Institute”, by the observer for IAASS;
 - (b) “Space sustainability rating: a voluntary exercise to incentivize operators towards sustainable behaviours in space”, by the representative of Switzerland;
 - (c) “SKAO, exploring space in radio frequencies”, by the observer for the Square Kilometre Array Observatory;
 - (d) “Managing the plume effect to assure the sustainability of lunar activities”, by the observer for For All Moonkind;
 - (e) “Satellites: working towards an equitable and sustainable future”, by the representative of the United States;
 - (f) “International Organization for Standardization activities for the long-term sustainability of space activities”, by the observer for ISO.
4. The Subcommittee had before it the following:
 - (a) Working paper by the Chair of the Working Group on the Long-term Sustainability of Outer Space Activities entitled “Draft terms of reference, methods



of work and workplan of the Working Group on the Long-term Sustainability of Outer Space Activities” (A/AC.105/C.1/L.400);

(b) Conference room paper by the Chair of the Working Group on the Long-term Sustainability of Outer Space Activities entitled “Draft terms of reference, methods of work and workplan of the Working Group on the Long-term Sustainability of Outer Space Activities” (A/AC.105/C.1/2022/CRP.13);

(c) Conference room paper by ESA entitled “Report on the implementation of the Guidelines for the Long-term Sustainability of Outer Space Activities in the European Space Agency” (A/AC.105/C.1/2022/CRP.14/Rev.1);

(d) Conference room paper by France entitled “General presentation of French activities and views concerning the long-term sustainability of outer space activities, in relation with the implementation of the 21 guidelines (A/74/20, annex II)” (A/AC.105/C.1/2022/CRP.20);

(e) [Conference room paper by the United Kingdom entitled [...].]

5. In accordance with General Assembly resolution 76/76, the Working Group on the Long-term Sustainability of Outer Space Activities was reconvened at the fifty-ninth session of the Subcommittee, with Umamaheswaran R. (India) as Chair.

6. The Subcommittee was informed of a number of measures that had been or were being undertaken to implement the Guidelines for the Long-term Sustainability of Outer Space Activities of the Committee (A/74/20, annex II). Those measures included the development of national space policy; the creation, review and updating of relevant domestic legislation; the ratification of relevant international treaties; the enhanced registration of space objects; the requirement that the approval of certain launch activities, namely launch permits and overseas payload permits, include debris mitigation strategies; improvements to government and commercial space situational awareness capabilities to detect, track and identify both active space objects and debris; the development of a monitoring system for objects falling from outer space; the development of a space situational awareness road map; work to replace national space-based space surveillance systems; the issuance of pre-launch notifications; the provision of conjunction analysis support; expanded government-private sector partnerships to increase communication, exchange data and establish best practices for autonomous spacecraft collision avoidance; the design of space missions so as to reduce the length of their presence in protected regions of space; the controlled removal, or repositioning to a graveyard orbit, of launch vehicles and spacecraft that had completed their operations; research on re-entry modelling; participation in the Inter-Agency Space Debris Coordination Committee; steps taken to protect infrastructure; national study groups focusing on implementing the Guidelines; the mapping of areas in which more work was needed to better implement the Guidelines; industry outreach, including work with domestic space research and industry sectors to understand their awareness, perspectives and activities related to the implementation of the Guidelines; and close cooperation between space agencies and stakeholders from various backgrounds, including space operators, industry and the scientific community.

7. The Subcommittee was also informed of various initiatives related to the Guidelines for the Long-term Sustainability of Outer Space Activities, including initiatives for their implementation. Those were, among others, the European Union space surveillance and tracking (EU SST) initiative; the Network for Space Object Tracking and Analysis (NETRA) of India; the space safety work of ESA; the prioritization of the safe use of space under the Association of Southeast Asian Nations Subcommittee on Space Technology and Applications; the co-sponsorship of a work item proposal at ISO on space traffic coordination; the issuance, in May 2021, of the notice on promoting the orderly development of microsatellites and strengthening safety management in China; the Unispace Nanosatellite Assembly and Training capacity-building programme of the Indian Space Research Organization (UNNATI); research and capacity-building undertaken through collaboration with

APSCO; the capacity-building work of the Asia-Pacific Regional Space Agency Forum; training and capacity-building opportunities offered through the regional centres for space science and technology education, affiliated to the United Nations; the Space Sustainability Rating project, initiated by the World Economic Forum; a workshop at the European level co-organized by Finland and Switzerland on implementing the Guidelines; the project of the Office for Outer Space Affairs entitled “Awareness-raising and capacity-building related to the implementation of the LTS Guidelines”, funded by the United Kingdom; the project of the Office for Outer Space Affairs entitled “Space law for new space actors”, funded by multiple donors, including Belgium, Chile, Japan, Luxembourg, APSCO, the Kyushu Institute of Technology and the Secure World Foundation; and a collaboration between the Office for Outer Space Affairs and ESA on a series of infographics and podcasts for social media.

8. Some delegations expressed the view that the sharing of experience, and the reviewing of best practices and lessons learned, in the practical national implementation of the Guidelines for the Long-term Sustainability of Outer Space Activities would enhance overall communication, international cooperation, awareness-raising and capacity-building and would have a positive effect on the space environment.

9. Some delegations expressed the view that the Guidelines for the Long-term Sustainability of Outer Space Activities should promote the safe and sustainable use of outer space, in the interest of all countries, irrespective of their degree of economic or scientific development, without discrimination of any kind and with due regard for the principle of equity, and highlighted the importance of international cooperation and technology transfer as effective means of promoting research programmes and building capacity in countries with emerging space sectors.

10. Some delegations expressed the view that the Working Group on the Long-term Sustainability of Outer Space Activities should swiftly reach consensus on its terms of reference, methods of work and workplan, so as to focus its efforts on its important substantive work.

11. The view was expressed that as more private actors entered the new space economy, it was critical that States collaborate with private actors to identify challenges to sustainability in order to ensure that all actors act responsibly, with due regard for the impact of their activities, both for the present and for the decades to come.

12. The view was expressed that identifying challenges associated with the implementation of the Guidelines for the Long-term Sustainability of Outer Space Activities and understanding what may be stopping countries from being able to implement the Guidelines, as was being done through interviews in the “Awareness-raising and capacity-building related to the implementation of the LTS Guidelines” project, was critical to understanding what would be needed for future capacity-building activities.

13. The view was expressed that the scope for implementing the Guidelines for the Long-term Sustainability of Outer Space Activities depended not only on nations’ levels of technical development, but also on political will.

14. The view was expressed that the evolving framework on the long-term sustainability of outer space activities must not impose undue or unreasonably high standards and obligations, which might be prejudicial to the interests of developing countries and nations with emerging space programmes.

15. The view was expressed that the Working Group on the Long-term Sustainability of Outer Space Activities and the open-ended working group on reducing space threats through norms, rules and principles of responsible behaviours, established pursuant to General Assembly resolution 76/231, were distinct but complementary, and that the Working Group on the Long-term Sustainability of Outer

Space Activities should remain focused on ensuring the safety and sustainability of civil space activities.

16. The view was expressed that the route to guaranteeing the long-term sustainability of outer space activities was through the creation of binding rules, as the existing legal framework was proving to be inadequate.

17. The view was expressed that the Scientific and Technical Subcommittee was an indispensable forum for the exchange of views on scientific and technical aspects of outer space activities and for fostering international cooperation for the peaceful exploration and the safe, sustainable intergenerational use of outer space.

18. The view was expressed that scientific, technical, legal and policy aspects were all relevant to the safety and sustainability of space activities and that there should therefore be close exchange on the topic between the Scientific and Technical Subcommittee and the Legal Subcommittee.

19. At its [...] meeting, on [...], the Scientific and Technical Subcommittee endorsed the report of the Working Group, as contained in annex IV to the present report.

20. [At its [...] meeting, on [...], the Subcommittee endorsed the terms of reference, methods of work and workplan of the Working Group, as contained in the appendix to annex IV to the present report.]

V. Space debris

21. In accordance with General Assembly resolution 76/76, the Subcommittee considered agenda item 8, entitled “Space debris”.

22. The representatives of China, Colombia, Germany, India, Indonesia, Iran (Islamic Republic of), Japan, Luxembourg, Mexico, the Netherlands, Pakistan, the Republic of Korea, the Russian Federation, South Africa, Spain, Thailand, the United Kingdom, the United States and Venezuela (Bolivarian Republic of) made statements under agenda item 8. The observer for SWF also made a statement under the item. During the general exchange of views, statements relating to the item were also made by representatives of other member States.

23. The Subcommittee heard the following scientific and technical presentations:

(a) “India’s efforts in space debris management”, by the representative of India;

(b) “Space situational awareness (SSA) activities in the Republic of Korea”, by the representative of the Republic of Korea;

(c) “IADC activities overview and latest updates of IADC documents”, by the representative of the Republic of Korea;

(d) “United States space debris environment and activity updates”, by the representatives of the United States;

(e) “Space sustainability activities of ESA in 2021”, by the observer for ESA;

(f) “Multi-satellite low Earth orbit constellations: interferences for routine space activities and astronomical observations – threats of uncontrolled space debris formation”, by the observer for CANEUS International.

24. The Subcommittee had before it information on research on space debris, the safety of space objects with nuclear power sources on board and problems relating to the collision of such objects with space debris, contained in replies received from Member States and international organizations (see A/AC.105/C.1/120, A/AC.105/C.1/120/Add.1 and A/AC.105/C.1/2022/CRP.11).

25. The Subcommittee noted with satisfaction that the endorsement by the General Assembly, in its resolution 62/217, of the Space Debris Mitigation Guidelines of the

Committee on the Peaceful Uses of Outer Space had proved vital in controlling the space debris problem for the safety of future space missions.

26. The Subcommittee also noted with satisfaction that many States and international intergovernmental organizations were implementing space debris mitigation measures consistent with the Space Debris Mitigation Guidelines and the Guidelines for the Long-term Sustainability of Outer Space Activities of the Committee and/or the Space Debris Mitigation Guidelines of the Inter-Agency Space Debris Coordination Committee (IADC), and that a number of States had harmonized their national space debris mitigation standards with those guidelines.

27. The Subcommittee noted that some States were using the Space Debris Mitigation Guidelines of the Committee, the European Code of Conduct for Space Debris Mitigation, ISO standard ISO 24113:2011 (Space systems: space debris mitigation requirements) and ITU recommendation ITU-R S.1003 (Environmental protection of the geostationary-satellite orbit) as reference points in their regulatory frameworks for national space activities.

28. The Subcommittee also noted that, in the area of space debris, some States were cooperating under the space surveillance and tracking support framework funded by the European Union and in the ESA space situational awareness programme.

29. The Subcommittee expressed concern at the increasing amount of space debris and encouraged States, agencies, industries and academic institutions that had not yet done so to consider voluntarily implementing the Space Debris Mitigation Guidelines and the Guidelines for the Long-term Sustainability of Outer Space Activities of the Committee.

30. The Subcommittee noted that IADC, whose initial work had served as the basis for the Space Debris Mitigation Guidelines of the Committee, had updated its own Space Debris Mitigation Guidelines in 2021 to reflect the evolving understanding of the space debris situation.

31. The Subcommittee noted with appreciation that States had undertaken a number of actions to mitigate space debris, such as improving the design of launch vehicles and spacecraft, developing special software, reorbiting satellites, passivation, life extension, end-of-life operations and disposal. The Subcommittee noted the evolving technologies related to the in-orbit robotic servicing of satellites, the extension of satellite lifespans and active space debris removal.

32. The Subcommittee noted the development and application of new technologies and ongoing research related to space debris mitigation; measuring, characterizing, continuous monitoring and modelling of space debris; prediction, early warning and notification of space debris re-entry and collision; protecting space systems from space debris; in-orbit servicing, refuelling and assembly technologies; and re-entry and collision avoidance techniques.

33. Some delegations expressed their serious concern over the placement of large constellations and megaconstellations of satellites and its implications, and, in that connection, expressed the view that that topic should be treated by the Subcommittee as a priority, with a view to mitigating the creation of space debris.

34. Some delegations expressed the view that the removal and mitigation of space debris should be carried out under an internationally agreed framework by the major contributors to space debris creation.

35. Some delegations expressed the view that spacefaring nations should undertake their historical and substantial responsibility in the mitigation of debris and put forward a viable plan to reduce the production of debris, followed by a workable strategy to collect the debris produced.

36. Some delegations expressed the view that developing countries needed to have access to technologies and methodologies for the measurement, monitoring and characterization of space debris and other space objects.

37. Some delegations expressed the view that it was necessary to build capacity and develop ways and means to transfer knowledge and technology in space debris mitigation in order to make space debris mitigation standards practical for implementation.
38. The view was expressed that all States should contribute to improving the quality of orbital data and increase the exchange of data and information on space operations and the space environment.
39. The view was expressed that relevant data-sharing and exchange among international space agencies and entities should be encouraged for effective monitoring and mitigation of space debris.
40. Some delegations expressed the view that the intentional destruction of space objects and the deliberate and unnecessary creation of space debris should be avoided.
41. The view was expressed that guideline 4 of the Space Debris Mitigation Guidelines of the Committee recognized the situations in which intentional break-ups were necessary and specified that such break-ups should be conducted at sufficiently low altitudes to limit the orbital lifetime of the resulting fragments.
42. The view was expressed that it was necessary to accelerate the establishment of a global network for monitoring space debris by laser telemetry for enhanced orbital predictions.
43. The view was expressed that it was necessary to establish an international platform, under the auspices of the Office for Outer Space Affairs, for sharing information, knowledge and technology for orbital manoeuvring and making the software required for conjunction assessment accessible for all States.
44. The view was expressed that it was necessary to implement space traffic management measures in view of the growth of megaconstellations.
45. The view was expressed that it was important to improve and refine the existing space debris mitigation guidelines and to promote the development of binding international standards.
